What is claimed is:

Sub B1

1. A method of forming a Cu alloy, comprising:

plating a layer of Cu over a substrate;

forming a dopant layer over the Cu layer;

driving dopants from the dopant layer into the Cu layer; and

removing the dopant layer.

2. The method of Claim 1, wherein the substrate comprises a diffusion barrier layer overlying a dielectric layer.

3. The method of Claim 2, wherein the diffusion barrier layer comprises a material selected from the group consisting of Ta, TaN, TaSiN, W, WN, WSiN, Ti, TiN, TiSiN, and Co.

4. The method of Claim 2, wherein forming the dopant layer comprises plating a layer of metal.

5. The method of Claim 4, wherein the metal layer comprises at least one element which when alloyed with Cu improves an electromigration characteristic of Cu.

6. The method of Claim 5, wherein the at least one element is selected from the group consisting of Sn, Al, Mg, and Co.

7. The method of Claim 5, wherein plating the layer of Cu comprises electroplating.

8. The method of Claim 5, wherein plating the layer of Cu comprises an electroless deposition.

9. The method of Claim 6, wherein driving dopants into the Cu layer comprises elevating the temperature of the dopant layer and Cu layers to between 300°C and 400°C.

10. A method of forming a Cu alloy, comprising:

plating a layer of Cu over a substrate; and

implanting at least one dopant element into the Cu layer.

11. The method of Claim 10, wherein the at least one dopant element is selected from the group consisting Al, Mg, and Sn.

12. The method of Claim 10, further comprising polishing the layer of Cu so as to form individual interconnect lines prior to implanting.

13. The method of Claim 12, further comprising depositing a barrier layer over the interconnect lines subsequent to implanting.

14. The method of Claim 13, wherein the barrier layer is formed of a material selected from the group consisting of SiC and SiN.

15. The method of Claim 12, further comprising depositing a barrier layer over the interconnect lines prior to implanting.

16. The method of Claim 12, wherein the dopant is implanted into the surface of the Cu to depth of about 10 monolayers.

17. The method of Claim 12, wherein the dopant is implanted a dose of 3E15 atoms/cm^2 at an energy of 5keV.

18. The method of Claim 12, wherein the dopant is implanted to achieve an implant profile peak at 50 angstroms below the Cu surface and a concentration of 1.5 wt% over 100 angstroms.

19. A method of forming a Cu alloy, comprising:

depositing a seed layer on a substrate, the seed layer comprising Cu and at least one doping element;

forming a capping over the seed layer;

forming a layer of Cu over the capping layer; and

driving the at least one doping element from the seed layer into the Cu layer.

20. The method of Claim 19, wherein the seed layer and the capping layer are formed sequentially and without exposing the seed layer to the atmosphere prior to deposition of the capping layer.

21. The method of Claim 20, wherein the seed layer and the capping layer are deposited in the same PVD system without breaking vacuum.

22. The method of Claim 19, wherein depositing the seed layer comprises sputtering a metal alloy, the metal alloy having at least one element that diffuses in Cu at a temperature less than or equal to 400°C.

23. The method of Claim 22, wherein the metal alloy is selected from the group consisting of CuSn and CuMg.

24. The method of Claim 22, wherein forming the capping layer comprises sputtering Cu.

25. The method of Claim 19, wherein driving the at least one doping element from the seed layer into the Cu layer comprises heating the substrate to temperature in the range of 300°C to 400°C.

26. The method of Claim 25, further comprising exposing at least the surface of the Cu layer to an ambient that reacts with the doping element.

27. The method of Claim 26, wherein the ambient comprises nitrogen.

28. The method of Claim 26, wherein the ambient comprises oxygen.

29. The method of Claim 19, wherein the substrate comprises a patterned dielectric layer having a copper diffusion barrier disposed of the surfaces thereof; depositing the seed layer comprises a physical vapor deposition in the absence of oxygen; forming the capping layer comprises a physical vapor deposition of Cu; forming the Cu layer comprises electroplating; and driving the at least one doping element from the seed layer into the Cu layer comprises heating the substrate and, concurrently therewith, exposing the Cu layer to at least one chemical that will react with the at least one doping element such that the at least one doping element is drawn to the surface of the Cu layer.